Economic Commentary

Velocity and Monetary Targets

by William T. Gavin

To interpret the monetary targets in 1983, we have to know where we have been and where we are going. The equation of exchange, $MV = PQ$, provides a simple accounting framework for keeping track of where we have been and for suggesting where we may be going. M is the money supply, however defined; V is the related velocity, or turnover of money; P is the general price level; and Q is real output.

The important variables are prices and real output. However, the central bank cannot determine how much of a given change in the money supply will go into prices and how much will go into output. In the long run output will be determined by real economic factors, such as population growth, capital accumulation, technology, and the incentive structure implied by tax laws and economic regulation. Even though changes in money growth may not affect output in the long run, changes in the money supply may have substantial effects in the short run.

The uncertainty about how monetary policy will affect prices and output over periods as short as one year has led economists to relate monetary targets to nominal gross national product (GNP), the product of P and Q. If the Federal

Reserve restrained money growth, it would restrain nominal GNP. Initially, real output may also be restrained (as we saw in 1981–82). Over time, real economic factors should dominate, and real growth should return to its underlying trend. If the reduced money-supply targets were maintained over a period of years, nominal GNP would be restrained and inflation would be reduced. All of this, of course, assumes a stable relationship between GNP and the money supply.

Since 1981, the income velocity of M-1, the primary money-supply target, has declined dramatically.[1]   The income

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1.   In this article the discussion of velocity is generally restricted, except when noted, to M-1 and M-2. M-1 consists of currency, demand deposits, travelers' checks, and other checkable deposits. M-2 includes M-1, small time and savings deposits, non-institutional money market mutual funds, overnight repurchase agreements, and Eurodollars. M-3 includes M-2, large-denomination time deposits, term RPs, and institutions' money market mutual fund balances. For more detailed definitions, see "Domestic Financial Statistics," *Federal Reserve Bulletin*, vol. 68, no. 12 (December 1982), p. A14. *Old M-2* refers to M-2 as defined before 1979, i.e., M-1 plus savings deposits, time deposits open account, and time certificates of deposit (CDs) other than negotiable CDs of $100,000 or more at large weekly reporting banks. Old M-2 did not include deposits at thrift institutions.

velocity of money is the ratio of nominal GNP to the money supply. The monetary targets are based on expectations for future velocity growth. If velocity growth deviates from the expected trend for an extended period, and if the Federal Reserve chooses to stay on a predetermined disinflation course, then the monetary targets have to be changed. This *Economic Commentary* examines the monetary targets in light of recent changes in the velocity of money.

Velocity of money is determined by the aggregate behavior of individual people and firms. This behavior depends on many factors, including the length of pay periods, the uncertainty of future income and expenditure flows, and the opportunity costs of holding wealth in the form of money.

Institutional factors also play an important role in determining velocity. The introduction of credit cards, for example, reduced the need to hold money for transactions purposes. Various cash-management techniques have greatly reduced the demand for money by firms.[2] The development of social-welfare programs, such as unemployment compensation, social security, and health-care subsidies, has reduced the need to hold precautionary balances.

Other special factors that influence velocity are associated with the Federal Reserve's policy to lower inflation. As expected inflation falls, domestic investors move out of real assets previously held as inflation hedges into nominal assets included in the monetary aggregates.[3] A lower expected inflation rate in the United States may lead wealthy

individuals and multinational companies to switch from other currencies into U.S. dollars. If such dollars were held as currency or as deposits in the United States, they would tend to reduce the income velocity of money.

The Velocity Assumption

Annual monetary targets are based on the assumption that changes in velocity are predictable within a narrow range. Velocity is said to have a deterministic trend if it has a predictable component that depends on nothing else but time. If velocity had a deterministic trend, then it would be predictable over long time periods; historical averages would be good indicators of future velocity growth, and the Federal Reserve could set targets for the money supply well into the future. Analysts who recommend pre-announced multi-year targets for the money supply implicitly assume a deterministic trend in which all short-term velocity fluctuations are temporary and offsetting.

Other analysts have argued that the trend in velocity is not deterministic, but that it is a function of many factors that can change over time. Consequently, they contend that it is not possible to predict velocity very far into the future. The Federal Reserve has implied agreement with this latter view, setting monetary targets for only one year at a time. The Federal Reserve's targeting procedure can be described as an "error learning" process in which the monetary targets are regularly reviewed and readjusted as unpredictable developments in velocity unfold. This strategy is consistent with an undeterministic velocity trend in which the short-term fluctuations include both a transitory component associated with the business cycle and a permanent component that changes the trend.

Monetary targeting does not require that velocity be a constant or even that it have a deterministic trend. Monetary

2. For a discussion of these techniques, see John B. Carlson, "Methods of Cash Management," *Economic Commentary*, Federal Reserve Bank of Cleveland, April 5, 1982.

3. See Michael W. Keran, "Velocity and Monetary Policy in 1982," *FRB SF Weekly Letter*, Federal Reserve Bank of San Francisco, March 18, 1983. Keran argues that the fall in expected inflation explains the large decrease in M-1 velocity in 1982.

targeting only requires that the central bank have a procedure for adjusting the targets when velocity deviates from what is expected. There are currently several methods for adjusting the targets. One method is the stating of monetary targets as ranges, usually 3 percentage points wide. When the velocity prediction is more uncertain than usual, the Federal Reserve can widen the target range. A range allows the Federal Reserve some flexibility as it gathers more information about velocity. A second mechanism for adjusting targets is the mid-year review in which the Federal Open Market Committee (FOMC) can change the target range. A third mechanism is the practice of basing the annual target on the actual average level of the money supply rather than the target level in the previous year's fourth quarter (year-end base drift). A fourth mechanism is the use of multiple targets. Factors that affect velocity of one of the monetary aggregates might not affect the others. The Federal Reserve has generally employed M-1 as the primary target. In periods when M-1 velocity was exceptionally uncertain, the Federal Reserve has placed more emphasis on the M-2 target.

An example of each of these mechanisms at work can be seen in last year's targeting experience. An unexpected decline in M-1 velocity in 1982 led the Federal Reserve to aim high in the range at the beginning of the year, to announce a desired growth rate at or above the upper limit of the range at the mid-year review, to place more emphasis on M-2 as of October 1982, and to accept a large overshoot in the fourth quarter as part of the base for the 1983 target.

Historical Trends

1880–1960. The long-run trend in velocity depends on the stage of development in the market economy and on factors that determine the costs and

Chart 1   Velocity of Money: 1880–1960
Annual data
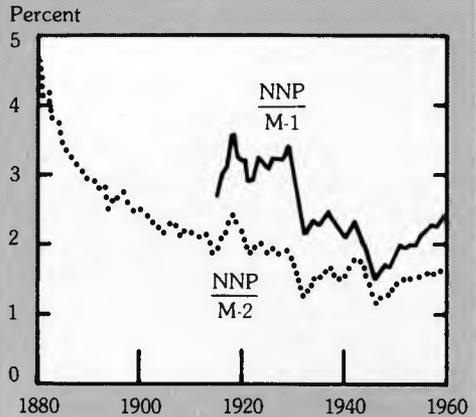
NOTE: Net national product (NNP) was used to measure income.

SOURCE: Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States, 1867–1960*, Princeton: Princeton University Press, 1963, table A-5, p. 774.

benefits of holding money. The long decline in the old M-2 velocity shown in chart 1 is attributed to economic progress. As the U.S. economy grew, the size of markets grew and people depended less on production for home use, barter, and payment in kind. Coincident with and because of the growth of the economy, the commercial banking industry developed and provided the notes and bank deposits that led to "monetization" of the economy. This process accounted for much of the decline in velocity prior to World War I. The decline in velocity between World War I and World War II can be attributed to falling interest rates and to the high level of economic instability associated with the Great Depression. During World War II velocity rose and then declined; the decline in velocity probably resulted from the imposition of price controls and rationing, as well as the uncertainty created by the war. The combined effect was a buildup of money balances as the war continued.

After World War II the development of close substitutes for money, credit cards, and sophisticated cash-management techniques tended to reduce the need to hold assets in the form of money. The post-World War II period was one of relative economic stability. Business cycles fluctuated less than in previous periods, and the federal government gradually increased the coverage of social-welfare programs, further reducing the need to hold precautionary balances.

Beginning in January 1934, Regulation Q prohibited the payment of interest on demand deposits and restricted the amount of interest that could be paid on savings and time deposits. The prohibition of interest payments on demand deposits and the interest-rate ceilings imposed by Regulation Q meant that a rise in interest rates would increase the opportunity cost of holding money.

In the first years of Regulation Q, interest rates were so low that the regulation probably had no effect on velocity. After World War II, however, accelerating inflation led to rising interest rates. The long-term Aaa corporate bond yield approximately doubled over each decade. As interest rates rose to new highs with each succeeding business cycle, the cost of holding money continued to rise.

1960-82. M-1 velocity continued to grow about 3 percent per year from 1960 until 1982, whereas M-2 velocity growth was approximately zero over the whole period (see chart 2, panels A and B). The divergence between velocity growth trends for M-1 and M-2 reflects binding interest-rate ceilings on demand deposits and innovations in the market that enabled depositors to economize on M-1 balances. The growth rate of M-1 velocity accelerated from 1974; indeed, the post-1974 decrease in M-1 demand was the focus of extensive research by the Federal Reserve. Although M-1 velocity was variable, it was predictable within

Chart 2   Velocity of Money: 1960–83
Quarterly data
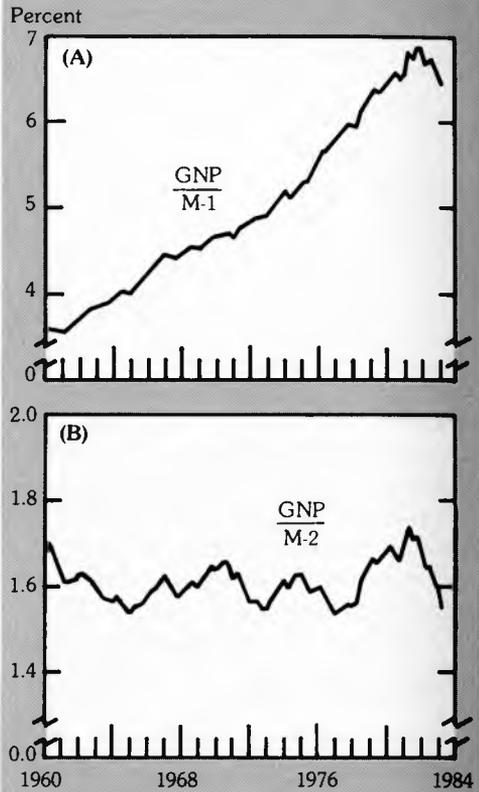
SOURCE: Board of Governors of the Federal Reserve System.

tolerances suggested by the monetary target ranges. This stability appears all the more remarkable in light of the many institutional and economic factors that were changing during this period.

In passing the Depository Institutions Deregulation and Monetary Control Act of 1980, Congress repealed many of the interest-rate ceilings that had been in effect since 1934. In January 1981 depository institutions nationwide were authorized to offer interest-bearing transactions accounts. The introduction of these new interest-bearing checkable accounts was expected to reduce velocity growth as the public went through the transition of moving money out of accounts, both savings and checking, into the new ac-

Table 1 Cycles in Velocity Growth

Aggre-gate	Period	Reces-sions	Recov-eries	Average
M-1	1948:IVQ – 1979:IVQ	–0.3	3.9	3.2
	1980:IQ – 1982:IVQ	–0.4	2.3	0.5
Old M-2	1948:IVQ – 1979:IVQ	–2.7	2.1	1.2
M-2	1960:IIQ – 1982:IVQ	–2.2	0.2	–0.4

counts.[4] In retrospect, it also appears that the new accounts may have permanently reduced the growth in M-1 velocity. This should be expected if we accept the premise that the prohibition against interest payments on demand deposits was largely responsible for the divergence between growth trends of M-1 and M-2 velocity after World War II.

Velocity in 1983

As of April 1983, 23 percent of M-1 consisted of interest-paying checkable deposits. Even more relevant for future velocity growth is that additions to M-1 are likely to be more heavily weighted in the new accounts. Super-NOW accounts, introduced in January 1983, have no regulatory ceiling on the interest rates paid if the account meets the $2,500 minimum-balance requirement.

Since the introduction of nationwide NOW accounts, there has been a remarkable drop in M-1 velocity. This decline in velocity has occurred over a business cycle with an unusually short recovery and an unusually long and deep recession. Postwar velocity for each of the monetary aggregates has typically grown more slowly than average during

recessions and more quickly than average during recoveries (see table 1). The most recent cycle included six quarters of recession and four quarters of recovery. M-1 velocity growth was –2.0 percent in the recession and 2.3 percent in the recovery—statistics similar to those for the old M-2 aggregate. If we adjust the cycle average for the unusually long recession and short recovery, we measure a "trend" of M-1 velocity growth in the last cycle around 1.3 percent.[5]

A rough estimation of the Federal Reserve's expectations about velocity for 1983 can be derived from information provided to Congress in the Humphrey-Hawkins report.[6] The GNP forecast (8.0 percent to 9.0 percent growth in 1983) is the "central tendency" of the forecasts by the Board of Governors and the individual Federal Reserve Bank presidents. The GNP forecast takes into account the targets chosen for 1983. The midpoint of the M-1 target is 6.0 percent, implying a "central tendency" forecast for M-1 velocity growth of 2.0 percent to 3.0 percent. The expectations for M-1 velocity are below the historical trend. Given the historical record of above-trend velocity growth in the first year of recovery, this forecast implies a downward shift in the M-1 velocity trend. The midpoint of the M-2 target is 8.5 percent, implying a "central tendency" forecast for M-2 velocity of –0.5 percent to 0.5 percent. The historical growth rate in recoveries was 0.2 percent, within this forecast range.

5. The actual average M-1 velocity growth for the last cycle is a weighted average of the growth in the recession and the growth in the recovery:

$$-0.3 = 6/10 \, (-2.0) + 4/10 \, (2.3).$$

From 1948:IVQ through 1982:IVQ, there were 141 quarters with 33 quarters of recession and 108 quarters of recovery. Using this experience as a guide, we can adjust velocity growth over the last cycle to see what it would have been if the cycle had been more like those in the past:

$$1.3 = 33/141 \, (-2.0) + 108/141 \, (2.3).$$

6. See "Monetary Policy Objectives for 1983," the report pursuant to the Full Employment and Balanced Growth Act of 1978 (Humphrey-Hawkins).

4. For further discussion of the effect of interest-bearing transactions balances on the monetary targets, see Theresa Gwazdauskas, "Interpreting the Ms after the NOWs," *Economic Commentary*, Federal Reserve Bank of Cleveland, May 4, 1981.

Conclusion

The rapid growth of the aggregates in late 1982 and early 1983 reflects both the flow of funds into new accounts and a policy adjustment in response to a downward shift in the velocity trends. The Federal Reserve seems willing to accept M-1 growth above the target range in 1983 as velocity continues to decline. If the decline persists, the target might have to be raised. If the public does not understand the relationship between velocity trends and the monetary targets, then the Federal Reserve's decision to raise the targets could be misconstrued as being inflationary.

If economic growth continues to accelerate, however, and velocity growth returns to historical patterns, then the Federal Reserve would have to lower M-1 growth to preserve recent success in reducing inflation. In this period of regulatory change and disinflation policy, the Federal Reserve might not be able to use M-1 targets to guide short-run, open-market operations. However, empirical evidence indicates that there has been a lag between changes in monetary policy and changes in economic activity. There should be time to adjust the long-run targets in response to large unexpected developments in velocity before they induce undesired changes in economic activity and prices.

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The views stated herein are those of the author and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

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